

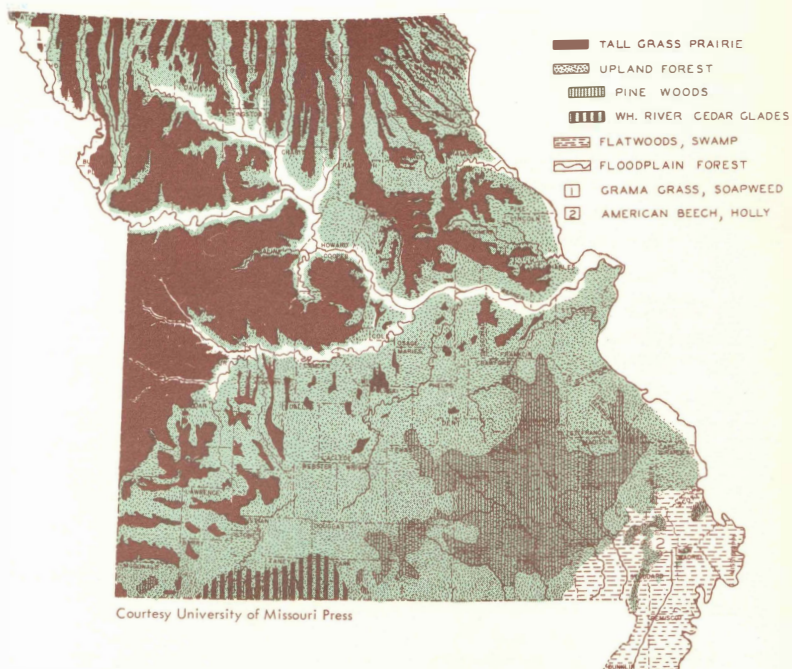
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A Missouri Natural Areas System



A Publication of
**THE MISSOURI
NATURAL AREAS COMMITTEE**

Department of Conservation
Department of Natural Resources



VEGETATION MAP

From Kucera, C. L., 1961, Grasses of Missouri. Courtesy University of Missouri Press.

Special Note

In April, 1977, just before this revision was completed, the Missouri Department of Conservation and the Missouri Department of Natural Resources entered into a cooperative agreement for coordination of a state natural areas program. Under the agreement each agency is represented by four members on a Missouri Natural Areas Committee. This Committee, which is now developing its procedures, will coordinate and administer a broadly-based statewide natural areas program. It envisions close coordination with other groups, agencies and citizens in selecting natural areas of high quality, and in establishing a central repository of information about natural areas.

The classification of natural area types described in this bulletin, which was originally prepared by the Department of Conservation, has been adopted by the Committee as the system it will use. It has proved workable in field application over the past five years. It will, however, be further refined as additional knowledge becomes available. The addition of a geological classification system, now in preparation by the Department of Natural Resources, is contemplated.

There is growing interest over the state in natural areas, and it seems especially fitting at this time to seek to centralize this interest in a single entity. The Missouri Natural Areas Committee will undertake to be that entity, in an open and cooperative way.

Introduction

"Why have natural areas?" "What's their purpose?" These are questions voiced by some, and perhaps in the minds of many who don't ask.

These questions might be best answered by citing excerpts from Gordon Harrison's preface to the book *Natural Areas in Indiana and Their Preservation*. Why natural areas? "The reasons," Mr. Harrison writes, "are various: Some are so deeply personal they can hardly be articulated except in terms of poetry; others have large social implications. Nature seen from the vantage point of the civilized life has for many people an esthetic appeal at least equivalent in spiritual values to great art, and the vision of the wild as God's handiwork is quite sufficient motivation for many who wish to preserve it....

"Beauty is often reason enough but it is not all, even for those who respond to it. Remote as city man may be from nature, ... there are good reasons to believe that the human race can no more develop its human potential in isolation from living creatures ... than can a child grow to fulfillment withdrawn from people.

"... the critical facts of life we need to understand for the sake of our own survival are those to be observed in natural communities ... the behavior of living organisms, their interactions with each other, their adaptations, their capacity to coexist in relatively stable self-regulating systems."

The preservation of examples, at least, of all parts of our native landscape has importance to every citizen.

Missouri is a state where a vast array of rivers and streams, tall grass prairies, mountains and forests meet to form a variety of ecological types. Here the upper reaches of the Mississippi delta, with its cypress-tupelo gum swamps, meet the edge of the Ozark highlands and its granite limestone bluffs and outcrops. And the Ozarks, in turn, join the prairies and fertile riverbanks of western and northern Missouri. Along with this variety of natural features, the central location of Missouri on the continent makes it a recipient of many plant and animal species from adjacent regions.

Influencing this unusual variety of natural treasures is a highly variable set of climates, soils, waters and geology. The resulting combinations create the outstanding diversity of ecological conditions that characterize the State of Missouri — and it is something to be proud of.

The diversity makes for a landscape that is truly beautiful, in all of its many aspects, and provides a natural biological variety seldom if ever duplicated in our land.

But the landscape has changed. Man in his use of the land has left only a slim margin of natural and undisturbed areas. Vast acreages have felt the impact of urban sprawl, highway construction, pollution, dams and reservoirs, mining and other land uses, and stream and river channelization. With all our modern tools and equipment, no piece of land or water seems remote or rugged enough to remain inviolate. Truly natural areas will need society's strong arm if they are to be preserved for the future.

Over the past 40 years, the Department of Conservation has put together a modest ownership of public conservation lands, waters and forests. Scattered within these lands are a number of high quality natural areas, all valuable and many irreplaceable. When originally purchased, recognition of the value of these natural areas was not high. Now, with much public and scientific concern over these jewels of the landscape, we realize that these earlier land purchases served as a "bank" for saving many outstanding outdoor features.

Aware that the preservation of natural areas requires deliberate effort, the Conservation Commission in 1970 directed the Department to begin setting up a natural areas system on Department lands. Natural areas are defined as biological communities, either terrestrial or aquatic, in a natural or nearly undisturbed state. Natural areas are often thought of as scenic, and certainly many of them are. But they need not be, and some are not, at least as we usually think of scenic beauty. The integrity of any undisturbed natural area, however, gives it a character that has beauty to the perceptive observer.

The directive provides that natural areas on Department lands shall be identified, cataloged, and steps taken to provide permanent protection or management designed to preserve representative

native plant, animal and aquatic communities, or rare members of such communities.

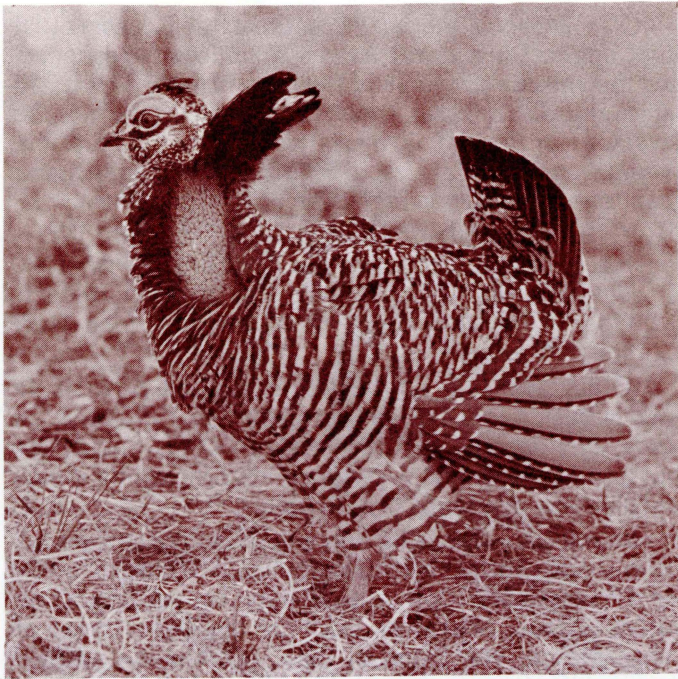
Since the adoption of the policy, a natural areas classification system has been developed, and natural areas on Department lands, and some in other ownerships, have been inventoried.

As natural areas are inventoried, classified and formally designated, management plans are developed to provide for their effective preservation. These plans include guides to management of adjacent land, as buffer zones, specific natural area management practices, if these are necessary, and management of visitors and use. Some areas require a minimum of attention; others that are "fragile" may need fairly frequent care. Generally, roads will not be built and vehicles will be prohibited. In most instances hunting and fishing will continue to be permitted unless the sheer volume of human traffic causes problems, or endangered species are being disturbed.

The natural areas program is a modest but growing one. At present, it deals largely with natural areas on lands owned by the Conservation Commission. In most cases, these are parts of some Wildlife Management Areas and State Forests. Funds have been limited for Department purchase of natural areas, but a number of high quality areas have been purchased by The Nature Conservancy, the L-A-D Foundation, and The Missouri Prairie Foundation and leased to the Department of Conservation for management and protection under the Department's natural areas system. The Department is also cooperating actively with other governmental agencies in inventory and registration of natural areas on their lands, and with private citizens to aid them in preserving areas they own.

Our current program of natural area preservation is but a good start. As the program grows, Missouri will one day have a statewide network of priceless natural features preserved for the future. Then it will be possible to "listen to the quiet," and be near those native natural treasures which may help preserve and enhance the very potential of man himself.

A separate publication, "Natural Areas of Missouri," lists the formally registered natural areas and provides a brief description of each. It is revised frequently in order that the information in it is up to date. Copies are available on request.



Policy for a Natural Areas System

It is the policy of the Conservation Commission that "natural areas" on its lands shall be identified and preserved. Natural areas are defined as biological communities, either terrestrial or aquatic, in a natural or nearly undisturbed state. They are to be permanently protected or managed for the purpose of preserving native plant and animal communities or rare members of such communities.

The Conservation Commission specifies that natural areas which it designates on its lands represent the highest and best use of these tracts, and the Commission will not authorize any use or diversion of such areas which is incompatible with the objective of natural areas preservation unless there is a critical need for which there is no alternative.

Some natural areas may be removed from this classification if better, more representative communities of the same type are later located and classified or if the value of the area is destroyed by outside influences. However, some duplication of types may be desirable to achieve good geographic distribution.

The Director of the Department of Conservation shall appoint a Natural Areas Committee, *representing the various divisions of the Department, which will select suitable natural areas, recommend them to the Director for formal designation by the Commission, prepare and maintain records, prescribe management practices, and provide for systematic inspections.

** The committee is chaired by an Assistant Director. Members represent the Divisions of Fisheries, Forestry and Wildlife, and the Natural History, Operations and Information Sections, plus staff specialists.*

Other agencies, organizations and individuals are encouraged to locate and protect natural areas on lands they control, and the Natural Areas Committee will provide technical assistance to such organizations and persons, insofar as practicable.

In addition, areas having qualities appropriate for natural area status on lands not owned or controlled by the Conservation Commission may be registered as natural areas, posted as such by the Department of Conservation, and listed in the Department's natural area publications and records, but only if the owner or controlling agency agrees to such registration and posting, and further agrees to use the natural area only in ways that will maintain its natural values. Any such area shall be removed from natural area registration if its natural values are degraded.

Although not natural areas within the scope of this policy, archeological, geological and historical features on lands which the Commission controls are recognized as resources of value to the State. Their identification, study and preservation by appropriate agencies or organizations may be permitted insofar as is consistent with the policies and programs of the Conservation Commission.

A Classification of Terrestrial Natural Communities in Missouri

Climate, waters, geology, soils, animals, and previous plants are important determinants in composition and density of plant communities. Across Missouri, wide variations occur in these factors, from the northern glaciated counties to the non-glaciated



western prairie, Ozark highlands, and southeastern lowlands. In addition, the central location of Missouri on the continent makes it a recipient of numerous species from adjacent biotic realms.

The following scheme identifies in broad outline the outstanding diversity of ecological conditions characterizing the State of Missouri. Some unique species localities are pointed out.

Common names of plants generally are those used by Steyermark (1963) in *Flora of Missouri*.

I. Glaciated Region (all counties north of the Missouri River). Soils derived from till plain and/or interglacial loess, generally deep, except on steep slopes with thin loess over Burlington limestone.

A. Natural Prairies and Barrens:

1. Loess mound prairie (northwestern corner of the state). Dry slopes and ridges from deep loess, overlooking the Missouri River. Plains flora, including buffalo grass, blue grama, and western soapweed.
2. Central prairies (rolling hills and broad valleys extending eastward to proximity of the Chariton River drainage). Relict species, including bluejoint and common reed in swales, big bluestem, Indian grass on lower slopes, and little bluestem, needlegrass and compass plant on upper slopes.
3. Claypan prairies (northern and east central counties, generally east of the Chariton River drainage, on flat, poorly drained terrain, extending generally on narrow tablelands to the Mississippi and Missouri River hills). Big bluestem and switch grass in the swales, Indian grass on midslopes, little bluestem and prairie dropseed on flat areas. The uniqueness of this region rests with its competitive relationship to forest invasion, since the prairie fingers (see vegetation map, inside front cover) are generally narrow and most drainages are occupied by natural woodlands.

B. Upland Forest:

1. Till slopes and breaks, continuous forest.
 - (a) Black oak, white oak on dry slopes and ridges.
 - (b) White oak, shagbark hickory, northern red

oak on the deeper soils, but generally the latter two species becoming more important in more protected sites.

2. Oak savannah and bluff exposures, thin forest or scattered trees.

(a) Burr oak, prairie grass transitions on till or deep soils with slow drainage.

(b) Post oak, blackjack oak, prairie grass openings on bluffs over Burlington limestone, soil well-drained.



3. River hills, bordering Missouri and Mississippi rivers. A distinctive, cove-like topography from deep loess deposits, affording a variety of sites and soil conditions for a rich spectrum of forest species.

C. Bottomland Forest and Floodplain:

1. Stream banks, soil usually sandy, subject to overflow. Cottonwood, willow, sycamore, box-elder, soft maple.

2. Terraces and upper valleys, soil loamy, less

subject to overflow. Elm, ash, soft maple, sycamore, walnut, pecan.

3. Gumbo prairie. Cord grass, pin oak.

II. Non-glaciated Region (all counties south of the Missouri River). Soils derived from a mixed type of residual, wind-blown and water-washed material; generally shallow, except in valleys and bottoms and in the southeastern lowlands.

A. Upland Forest.

1. Continuous forest.

(a) Mixed pine-hardwoods on cherty, acid or sandy soils, shortleaf pine and xerophytic oak species such as blackjack oak, southern red oak, black oak.

(b) Black oak, post oak, white oak type on thin, acid soils. Scarlet oak and black hickory also can be characteristic species.

(c) White oak, northern red oak, shagbark hickory type on deeper soils.



(d) White oak, sugar maple type, limestone slopes and colluvial soils, with good drainage.

(e) Blackjack oak, post oak type on fragipans and poorly drained soils.

(f) Northern red oak, white oak, and especially sugar maple and basswood in deep

ravines and cove sites; generally the latter two species becoming more abundant in more protected sites. This is the Ozark counterpart to glaciated types I.B.1.(b) and I.B.3.

2. White River bluffs, a distinctive topographic development of high bluffs and steep slopes along the White River. A rich forest flora including the cucumber tree and the rare fringe tree.

Man in his use of the land has left only a slim margin of natural undisturbed areas. Vast acreages have felt the impact of urban sprawl, highway construction, pollution, dams and reservoirs, mining and other land uses, and stream and river channelization.

3. Oak savannahs and rocky barrens.
 - (a) Post oak prairie transitions and glades on sandstones in southern Missouri. Little bluestem, pine-weed, blue curls.
 - (b) Eastern red cedar and prairie glades on dolomites and limestones in southern Missouri; frequently in the southwestern Ozarks. Bluestem grasses, Missouri primrose, white upland aster and, in some eastern Ozark counties, Fremont's leather flower.
 - (c) Scrub oak, shrubby barrens on granite outcrops in St. Francois Mountain region. Blackjack oak, hairy-lip fern, rushfoil; eastern witch hazel and winterberry near streams.

B. Bottomland Forest and Floodplain.

1. Ozark witch hazel in narrow stream beds with gravel bars.
2. Willow species and floodplain associates of major streams throughout the Ozark region.
3. Burr oak, cherry-bark oak, overcup oak; southeastern lowlands.

4. Cypress, tupelo gum forests; southeastern lowlands.
5. Cane brake communities along Mississippi and certain drainages of the southern Ozarks.

C. Natural Prairies.

1. Western prairies from Ozark border region to Kansas. Typical tall grass species with additional representatives from the Ozark flora. Bluestems, Indian grass, gay feather, purple coneflower, coreopsis, shooting star, prairie chicken, Franklin's ground squirrel.

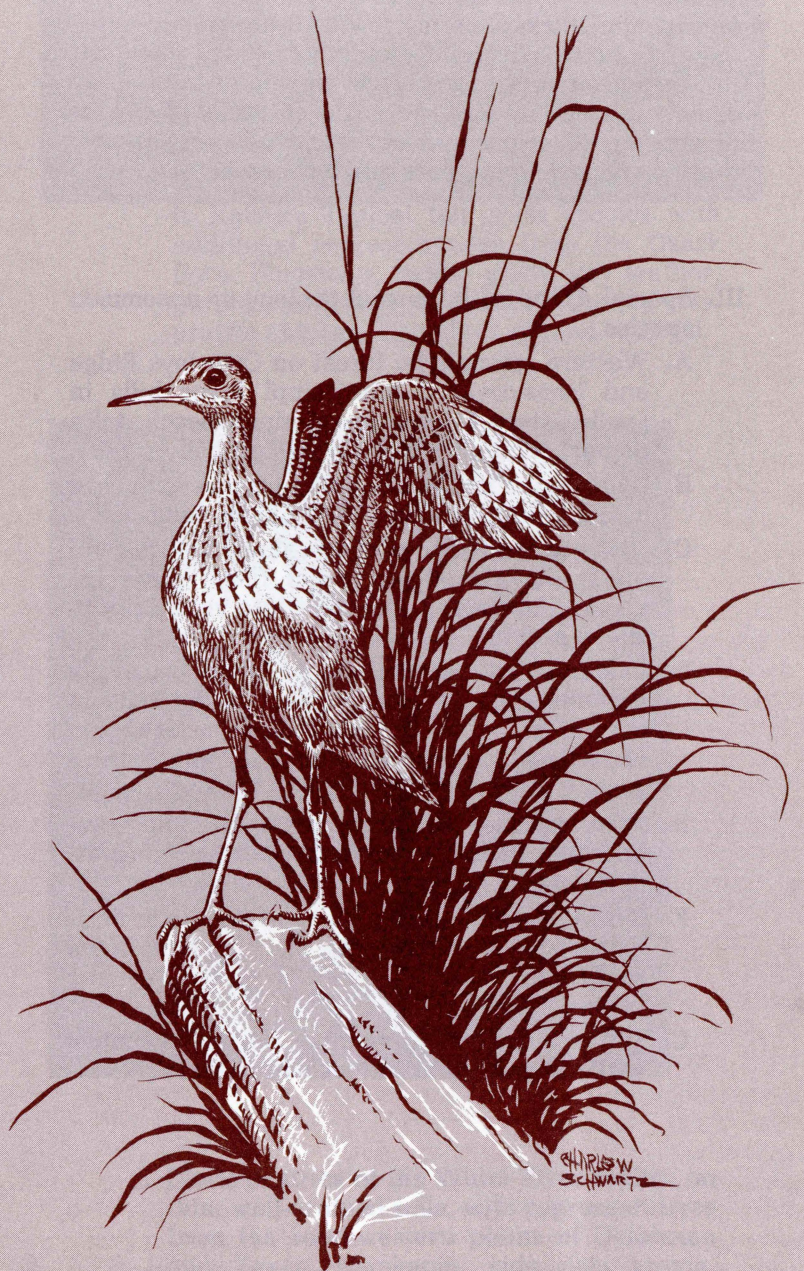


2. Glade prairies of the White River region, on thin, well-drained soils, with representatives from the southwestern plains of Oklahoma and Texas. Chinkapin, side oats grama, shooting star, purple coneflower, cactus, bald grass, rattlesnake master, wild hyacinth, wild larkspur, roadrunner.

Natural areas are defined as biological communities, either terrestrial or aquatic, in a natural or nearly undisturbed state. Natural areas are often thought of as scenic, and certainly many of them are. But they need not be, and some are not, at least as we usually think of scenic beauty. The integrity of any undisturbed natural area, however, gives it a character that has beauty to the perceptive observer.

III. Special Areas with unusual ecology or uncommon species.

- A. Western mesophytic forest on Crowleys Ridge and loess-covered Mississippi River hills in southeastern Missouri. American beech, tulip poplar, cucumber tree, American holly.
- B. Upland sinkhole ponds in the Ozarks with rare coastal plains species. Buttonbush, hibiscus.
- C. LaMotte sandstone canyons, shaded ledges and bluffs. Rare northern relict flora: partridge berry, clubmosses, smooth white violet, rattlesnake orchid.
- D. Calcareous wet meadows and woody bogs; cool groundwater seepage areas with unusual plants: marsh fern, royal fern, marsh blue violet, swamp thistle, common alder, rare sedges.
- E. Cave systems, with their unusual fauna: cave-adapted fishes, salamanders, invertebrates, and bats.
- F. Bluff face communities along limestone or dolomite cliffs. Wild hydrangea, columbine, alum root, cliffbrake, eastern wood rat, nesting phoebes.
- G. Salt springs of Saline and Howard counties with saltgrass and saltbush species.

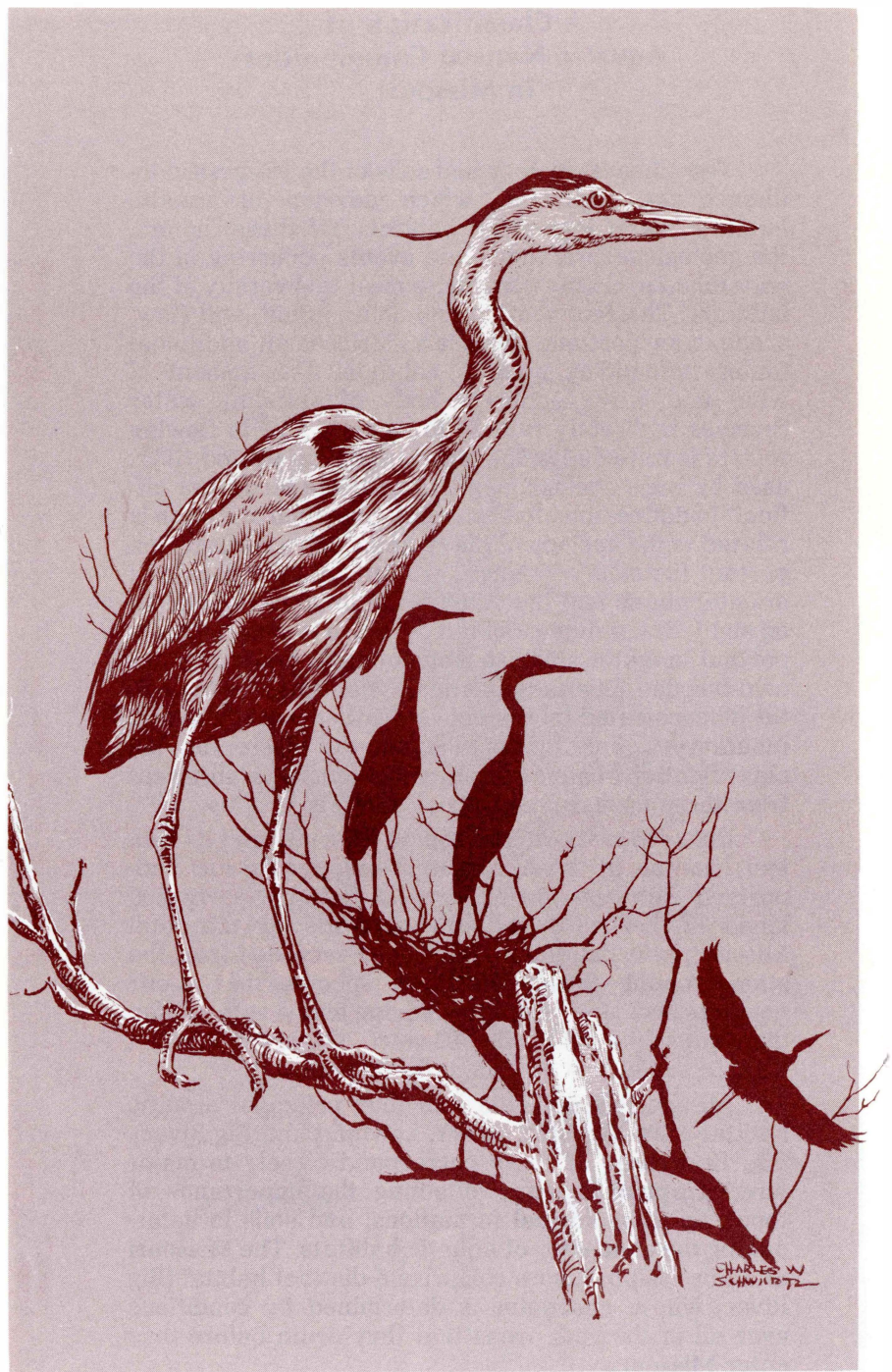


A Classification of Aquatic Natural Communities in Missouri

The climate, geology and soils of the watershed influence the organisms which develop in aquatic habitats, as in terrestrial habitats. Of these factors, the geological formations and events occurring in the watershed probably contribute most to diversity of the habitats. The fact that water, being liquid, will flow, erode, transport and deposit material is an additional factor influencing aquatic habitats. The amount of wind and wave action a body of standing water receives is directly related to its size. Size in flowing waters is reflected in the terms brook, creek and river, used by some ecologists, although these terms are difficult to define objectively. Gradient, which of course is related to the geology of the region, is an extremely important factor in streams. Turbidity inhibits growth of aquatic plants and the activities of animals dependent on sight. The influence of temperature is especially important in water since so many aquatic organisms are cold-blooded. Diversity in aquatic habitats is often better demonstrated by the animal, rather than the plant, inhabitants. For these reasons, the basis for the classification of aquatic habitats is somewhat different from those used for terrestrial habitats.

Because of its physiographic diversity and its central location in the Mississippi valley, Missouri supports a rich and varied aquatic fauna. Nearly 200 kinds of fishes, or about two-thirds of the total Mississippi valley fauna, have been recorded from the state. Among these are three species that occur nowhere else, and 17 species having only a very limited distribution outside of Missouri. Other groups of aquatic organisms are similarly diverse.

Missouri is divisible into four principal aquatic habitat areas (Prairie, Ozark, Lowland and Big River). The first three of these correspond closely to major physiographic regions, reflecting the importance of topography, geological formations, and soils in determining the character of aquatic habitats. The Missouri and Mississippi Rivers comprise a distinct habitat (Big River) whose character is determined by conditions over all of the vast areas that they drain before they enter Missouri.



The following classification is based largely on fishes, because their distribution is better known than that of other aquatic organisms. The distinctions made between habitats are somewhat arbitrary, since no two bodies of water are exactly alike, and the types commonly grade insensibly into one another. This is particularly true of streams, where a downstream transition in habitat conditions and species may occur from headwater creeks to large rivers.

I. Prairies. The level to gently rolling or hilly northern and west-central part of Missouri, both glaciated and unglaciated. Drainage patterns are frequently trellised, stream gradients are low or moderate, and the larger rivers occupy broad valleys that, in places, grade imperceptibly into surrounding uplands. The water is often turbid, base flows are low, and sand-silt bottoms are characteristic. Most streams have been straightened or channelized.

A. Standing waters.

1. Oxbows and sloughs: The abandoned channels of streams. Common fishes include gizzard shad, golden shiner, fathead minnow, black bullhead, and white crappie.
2. Marshes: Low, more or less permanently inundated areas covered by grasses and sedges.

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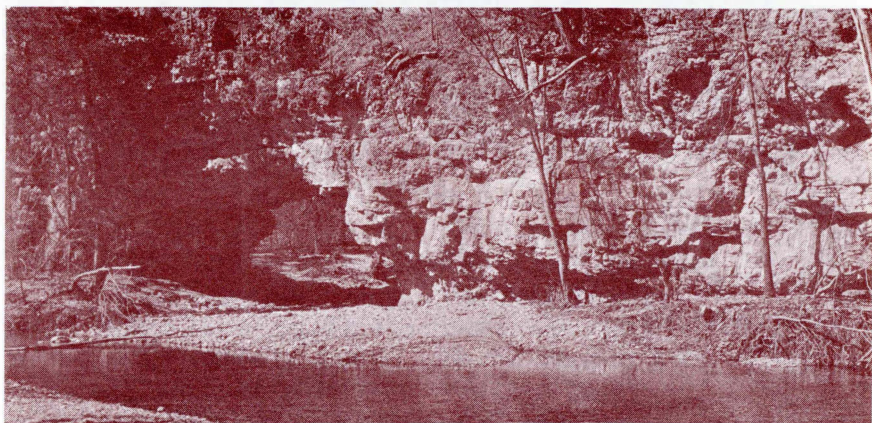
B. Flowing waters.

1. Headwaters:

- (a) Small streams draining dissected uplands adjacent to large rivers (e.g., Shoal Creek, Putnam County). Stream gradient moderate or high; water moderately clear; riffles well defined; gravelly or rocky bottoms common. Characteristic fishes include creek chub, bigmouth shiner, white

sucker, green sunfish and johnny darter. The common shiner, Topeka shiner, and brassy minnow are largely restricted to streams of this type.

- (b) Small streams draining undissected uplands along major divides (e.g., South Fork Salt River, Audrain County). Stream gradient low; riffles poorly defined; bottoms principally sand, silt and organic debris (very little gravel or rock). Characteristic fishes include shiner, fathead minnow, black bullhead, bluntnose darter and slough darter.
 - (c) Small streams draining loess mounds of northwestern Missouri (e.g., Mill Creek, Atchison County). Moderate to high gradient creeks, deeply incised in loess deposits. Restricted fish fauna but including flathead chub, river shiner, and plains killifish.
2. Creeks and small rivers (e.g., Perche Creek, Boone County): Flow permanent except in extreme drouths; gradients low; bottoms principally sand and fine gravel. Characteristic fishes include suckermouth minnow, red shiner, sand shiner, channel catfish, orangespotted sunfish, and blackside darter. The trout perch and ghost shiner are largely restricted to streams of this type.



Clifty Creek Natural Area

3. Larger rivers (e.g., Grand River, Livingston County): Streams of low gradient with permanent flow and sandy or silty bottoms. Characteristic fishes include paddlefish, shortnose gar, goldeye, silver chub, plains minnow, river carpsucker, stonecat and flathead catfish.

4. Springs:

(a) Saline springs: Boone's Lick Spring, Howard County, supports the easternmost self-sustaining populations of the plains killifish. Elk Lick Spring, Saline County, is the only station in the interior United States with brackish marsh grass.

(b) Freshwater springs.

II. Ozark Highland and Ozark Border. The topography is deeply dissected along major divides. Drainage patterns are palmate, gradients are moderate or high, and the streams occupy narrow, steep-sided valleys. The water is generally clear, base flows are high because of numerous springs, and bottoms of chert gravel or rubble are characteristic. Thirteen kinds of fishes are endemic to the Ozark Highland.

A. Standing waters.

1. Oxbows and sloughs: Typically warm (unless spring fed) with bottoms of silt and organic debris and often choked with milfoil and other submergent plants. Characteristic fishes include grass pickerel, spotted sucker, creek chubsucker, yellow bullhead, plains topminnow, redear sunfish and least darter.

2. Marshes: Low, more or less permanently inundated areas covered by grasses and sedges.

3. Sinkhole ponds: No native fish fauna because of inaccessability and/or periodic drying, but some support rare floras.

B. Flowing waters.

1. Headwater streams:

(a) Streams draining intricately dissected uplands underlain principally by limestones and dolomites (e.g., Indian Creek, Washington County): Flow permanent because of numerous springs; stream

channel consisting of a succession of well defined riffles and short pools floored by chert gravel. Characteristic fishes include hornyhead chub, bleeding shiner, Ozark minnow, southern redbelly dace, largescale stoneroller, slender madtom, studfish, stippled darter and barred fantail darter.

- (b) Streams draining level to rolling uplands capped by sandstones and shales (e.g., Dry Fork, Dent County): Flow often intermittent; stream channel consisting of poorly defined riffles and long deep pools. Characteristic fishes include grass pickerel, bigeye shiner, redbfin shiner, striped shiner, blackstripe topminnow, creek chubsucker, spotted sucker, and yellow bullhead.

As natural areas are inventoried, classified and formally designated, management plans are developed to provide for their effective preservation. These plans include guides to management of adjacent land, as buffer zones, specific natural area management practices, if these are necessary, and management of visitors and use.

- (c) Streams draining igneous areas of the St. Francois Mountains (e.g., Stouts Creek, Iron County): Certain crayfish (*Orconectes quadrandus*, *O. peruncus*, *O. hylas*, *O. medius*, *O. harrisonii*) are endemic to these streams.
- (d) Streams draining stony prairies of the Ozark border (e.g., Hogle Creek, Hickory County): Flow intermittent; water warm and clear, aquatic vegetation abundant. Support remnant populations of the blacknose shiner, a species now largely extirpated from Missouri.
- (e) Streams occupying deep, narrow valleys carved from the Roubidoux sandstone formation (e.g., Arthur and Bender

Creeks, Texas County): Characterized by permanent flow, stable bottoms, deep, boulder-strewn pools, and abundant aquatic vegetation. Fish population includes the blacknose shiner, a species now largely extirpated from Missouri. Also, inhabited by thriving populations of the cottonmouth water moccasin.



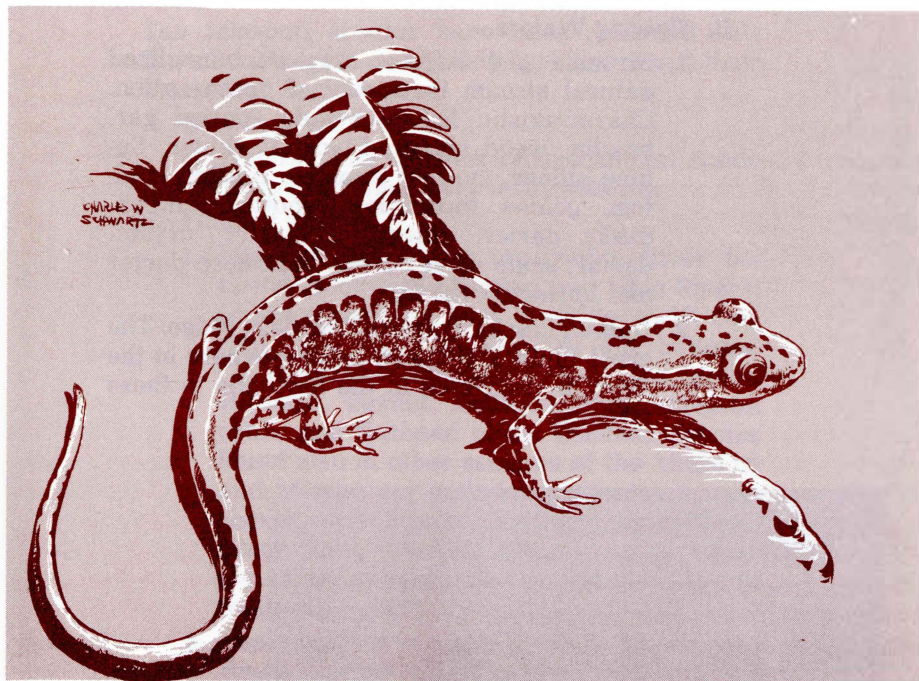
Piney Narrows Natural Area

- (f) Streams draining the LaMotte Basin (e.g., River Aux Vases, Ste. Genevieve County): Characterized by sustained flow, few riffles or deep pools, and sandy bottoms. Water clear, shaded by dense streamside vegetation, with little aquatic vegetation. These streams occur in a topographic region characterized by sloping, forested valleys, twisting stream courses, and sandstone ledges and ra-

vines. The most characteristic fish is the silverjaw minnow. Other species likely to be present are the northern redbelly dace, creek chub, bluntnose minnow, big-eye shiner, redbfin shiner, striped shiner and creek chubsucker.

Amphipods and isopods are abundant in spring seeps commonly found in the upper reaches of stream courses. Amphipods include *Gammarus troglophilus*, restricted to southeast Missouri and Illinois, and *Stygobromus heteropodus*, known only from Pickle Spring at the headwaters of Pickle Creek.

2. Creeks and small rivers (e.g., Big Piney River, Texas County): Characteristic fishes include bigeye chub, rosyface shiner, wedge-spot shiner, hog sucker, redhorse sucker, blackspotted minnow, smallmouth bass, rock bass, and numerous species of darters. The northern and southern brook lampreys, blue-stripe darter, *Niangua* darter and yoke darter are largely restricted to streams of this type.
3. Larger rivers (e.g., Current River, Ripley County): Characterized by an abundance of large fishes and a great variety of minnows and darters. Species largely restricted to streams of this type are American brook lamprey, Alabama shad, chain pickerel, stream-line chub, whitetail shiner, Ozark shiner, telescope shiner, slim minnow, river redhorse, Ozark madtom, checkered madtom, and Arkansas saddled darter.
4. Springs and spring branches: Characterized by great stability of flow, temperature and other environmental factors. Characteristic fishes include least brook lamprey, southern redbelly dace, creek chub, white sucker, and mottled sculpin. The Arkansas darter is restricted to streams of this type.
5. Cave streams: The Ozark cavefish and southern cavefish are restricted to this habitat, as are certain salamanders, the crayfish *Cambarus setosus*, and other invertebrates.



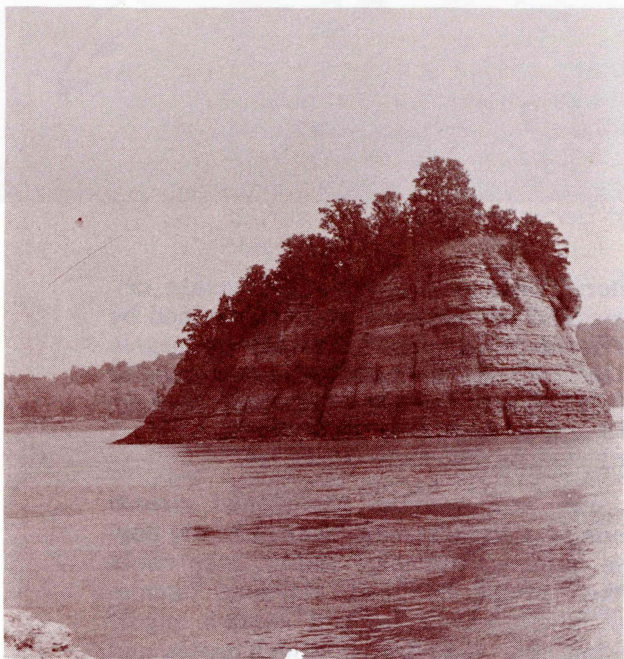
III. Southeastern Lowland. A broad alluvial plain, originally occupied by extensive swamps drained by sluggish streams. Swamps and streams are largely replaced by drainage ditches. Numerous coastal plain species reach the northern limit of their range in southeastern Missouri.

A. Standing Waters.

1. Oxbows and sloughs: Abandoned stream channels. Characteristic fishes include pugnose minnow, ironcolor shiner, lake chubsucker, brown bullhead, starhead topminnow, pirate perch, bantam sunfish, pigmy sunfish, flier, mud darter, slough darter and cypress darter.
2. Cypress swamps: Formerly the most widespread aquatic habitat in the lowlands, but now largely gone. Inhabited by the same fishes as the preceding category.
3. Blue Holes: Natural lakes formed by scouring by the Mississippi River during floods. Inhabited by a mixture of lowland and big river fishes characteristic of quiet waters.

B. Flowing Waters.

1. Streams and bayous: Any unchannelized natural stream is worthy of preservation. Characteristic fishes include spotted gar, bowfin, weed shiner, blacktail shiner, Sabine shiner, cypress minnow, bridled madtom, golden topminnow, spotted sunfish, dusky darter, stargazing darter, crystal darter, scaly sand darter, bluntnose darter and harlequin darter.
2. Upland creeks draining Crowleys Ridge: The creek chub, a common fish elsewhere in the state, is restricted in the lowlands to these streams.



Tower Rock Natural Area

- ## IV. Big Rivers.
- Because of their great size and other factors, the Missouri and Mississippi Rivers constitute a distinct aquatic habitat which supports a fish fauna unlike that found elsewhere in Missouri.

Ten Missouri species have been recorded only from the Missouri and Mississippi Rivers and their associated backwaters.

A. Standing Waters.

1. Oxbows and sloughs: Environmental conditions and fishes vary with localities.

B. Flowing Waters.

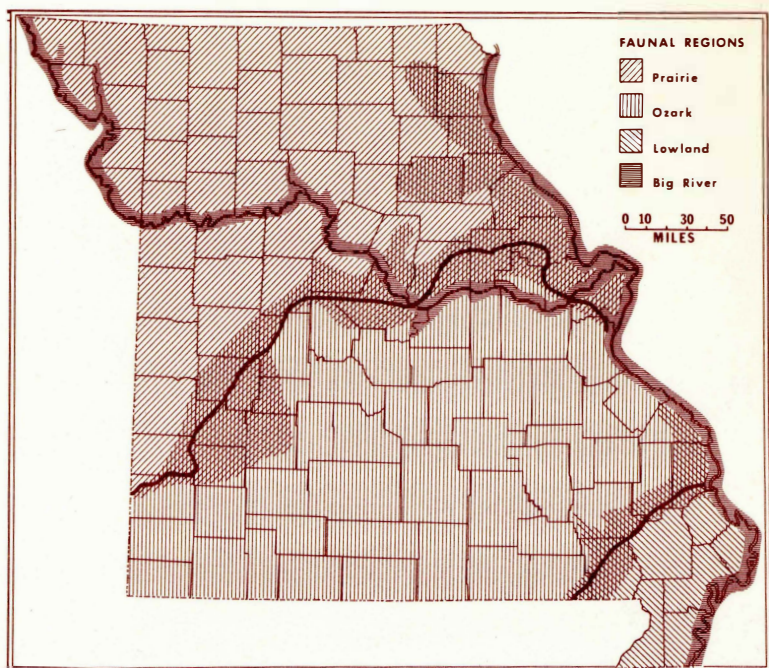
1. Missouri River and Mississippi River between mouths of Missouri and Ohio Rivers: Characterized by high turbidity, swift current, and unstable sand or silt bottoms. Characteristic species include the pallid sturgeon, burbot, sicklefin chub, sturgeon chub, and flathead chub. Common species found also in other sections of the Missouri and Mississippi include chestnut lamprey, shovelnose sturgeon, shortnose gar, goldeye, silver chub, speckled chub, channel mimic shiner, blue sucker, blue catfish, sauger and freshwater drum.
2. Mississippi River above mouth of Missouri River. Clearer than Missouri River, with less current and areas of coarse gravel or rubble bottom. Fish fauna more complex, reflecting greater diversity and stability of aquatic habitats. Species achieving greatest abundance here include silver lamprey, emerald shiner, river shiner, freckled madtom, western sand darter and river darter.
3. Mississippi River downstream from mouth of Ohio: The flow of the Mississippi more than doubles at the mouth of the Ohio, resulting in considerable reduction in turbidity; rubble bottoms absent. Threadfin shad and Mississippi silverside reach the northern limits of their natural range in this section of the Mississippi. Other species, including the alligator gar and skipjack herring, are more abundant there than elsewhere in Missouri.

Other organizations and agencies — The Nature Conservancy, The Missouri Prairie Foundation, the L-A-D Foundation, the Society of American Foresters, the U.S. Forest Service, the National Park Service, the Missouri Botanical Garden, certain universities — are active in natural areas preservation and study. The Missouri Natural Areas Committee maintains a close relationship with these groups in development and maintenance of a statewide system of natural areas.

For additional information write:

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